

# JAPAN

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JIS B 9651 (1988) (English): Design rules for  
safety and sanitation of baking machinery

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*The citizens of a nation must  
honor the laws of the land.*

Fukuzawa Yukichi

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**JAPANESE INDUSTRIAL STANDARD**

**Design Rules for Safety and  
Sanitation of Baking Machinery**

**JIS B 9651**—1988

**Translated and Published**

**by**

**Japanese Standards Association**

In the event of any doubt arising,  
the original Standard in Japanese is to be final authority.

## JAPANESE INDUSTRIAL STANDARD

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Design Rules for Safety and  
Sanitation of Baking Machinery

B 9651-1988

1. Scope

This Japanese Industrial Standard specifies the general matters other than those specified in JIS B 9650 concerning the safety and sanitation countermeasures on design, manufacture, installation and operation of baking machinery and attachments, hereinafter referred to as the "machinery".

Remark: The baking machinery specified in this Standard means the vertical type mixer, horizontal type mixer, divider, rounder, moulder, proof box, oven, frier, slicer, bean-jam wrapping machine, depositor, and make-up table out of many machines to be used in general manufacturing process of making bread by refining wheat flour and other raw materials, mixing, kneaders, dividing, rolling, forming, fermentation, calcining, oil frying, drying, cutting and cooling.

2. Definitions

For the purposes of this Standard main definitions shall be in accordance with JIS B 9650, and in addition the following apply:

- (1) vertical type mixer A machine to make bread dough by mixing liquid, mucilage or solid raw materials and their mixtures, agitating, and kneading, having vertical shaft agitator to be moved in a bowl by power.
- (2) horizontal type mixer A machine to make bread dough by mixing liquid, mucilage or solid raw materials and their mixtures, agitating and kneading, having horizontal shaft agitator to be moved in a bowl by power.

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Applicable Standards:

JIS B 8404-Gun Type Oil Burners

JIS B 8405-Low Pressure Air Atomizing Oil Burners

JIS B 8406-Rotary Oil Burners

JIS B 8415-General Safety Code for Industrial Combustion Furnaces

JIS B 9650-General Design Rules for Safety and Sanitation of  
Food Processing Machinery

- (3) divider A machine to divide the dough lump to definite size.
- (4) rounder A machine to form the divided dough pieces to surface skin and to spherical shape.
- (5) moulder A machine to draw out gas from dough pieces or form them.
- (6) proof box A machine to promote fermentation of dough. There are intermediate fermentation apparatus and final fermentation apparatus.
- (7) oven A machine to calcine the dough pieces formed or passed through fermentation process. There are mainly the following.
  - (a) direct fire type oven An oven of system to combust fuel directly in the calcining chamber.
  - (b) direct fire circulation type oven An oven of system to use by mixing the used gas and new combustion gas, which has one or more sets of heating apparatus at inside or outside of combustion chamber and each heating apparatus has one burner.

The combustion gas is circulated through calcining chamber and heating apparatus by a fan, a part of used gas is removed by overflow or vent apparatus and new fresh combustion gas is supplied auxiliarily from the burner.
  - (c) indirect heating multiple burner type oven An oven of system to heat by enclosing the burner part (generally, the gas burner) so that the non-combusted gas, combusted matters, etc. do not enter in the calcining chamber.
  - (d) indirect heating circulation type oven An oven provided with combustion duct, combustion chamber and circulation blower. The combustion gas circulates in this closed system with mixing with new-fresh combustion gas in combustion chamber, releases a part of gas at exhaust gas opening or over flow part and new-fresh combustion gas is supplemented from the burner, and the non combustible gas or combustion refuse are made not to enter in the calcining chamber.
  - (e) electric type oven An oven of system to heat with generating heat by flowing electricity through resistor.
- (8) frier A machine having mechanism for oil frying and the oil retaining tank.
- (9) slicer A machine to cut to a definite size or an optional size. There are three types of reciprocating type slicer, band slicer and circular shape slicer.
- (10) bean jam wrapping machine A machine to work for forming foods in which bean jam, cream, jam, etc. are made the wrapped-in materials and the cake dough or raw material resembled thereto in shape are made outer skin.
- (11) depositor A machine to extrude bean jam, cream, jam, cake dough, etc. continuously or into spot state.

- (12) make-up table A machine for forming work such as dividing, folding, twisting, cutting, etc. to the dough to be fed continuously or the dough of sheet state by each type apparatus arranged on the conveyor.

3. Safety and Sanitation Countermeasures for Division of Machine

3.1 Vertical Type Mixer

3.1.1 Safety Countermeasures The safety countermeasures shall be as follows:

- (1) The mixer having a vertical type agitating shaft shall be provided with the following safety devices:
  - (a) The safety guard set with enclosing the agitating shaft above the bowl shall, as required, be a structure capable of opening and closing in large degree, in which when the opening part is opened, the power is shut-off automatically
  - (b) In the case of (a), it shall be of such structure that the power stopped once does not actuate again if the switch is not "closed" again, even the opening part is closed.
  - (c) In the case of setting a timer, the one having humidity resistance shall be used.
- (2) The vertical type mixer shall be provided with respective single independent motor and its controller. Provided that the humidity resistance shall be taken into consideration.
- (3) The electric control board to be installed at the outer part of vertical type mixer shall be of drip-proof structure.
- (4) In the case where a mixer is set, it shall be so made that the position does not deviate and excessive vibrations are not generated.

3.1.2 Sanitation Countermeasures The sanitation countermeasures shall be as follows:

- (1) The collar of bowl shall be of such structure having no clearance, and the one to be attached to the outer surface of bowl, be sealed.
- (2) All surface materials shall not absorb the food raw materials.
- (3) It shall be of such structure that the oil oozed out from the bearing part of agitating shaft does not drip down to the food-contacting part.
- (4) Sufficient spaces for cleaning the all surfaces shall be provided and their height, at not higher than the height of eyes capable of confirming stains on the upper surface, as far as possible.



- (5) Excepting where it is set tightly on the floor, the mixer shall be provided with a clearance of 150 mm or more from the floor surface or a space sufficient for easy cleaning.

### 3.2 Horizontal Type Mixer

3.2.1 Safety Countermeasures The safety countermeasures shall be as follows:

- (1) The horizontal type mixer having automatic or hand operating bowl overturning device shall be so made that when the bowl is opened not less than 1/5, the agitator can not be started in motion if the worker does not use his both hands.
- (2) The horizontal type mixer attached with an automatic overturning device shall be of such structure that for hermetically sealing the bowl without closing 4/5 or more of complete opening in the opening state of bowl, the worker further operates the electric motor for overturning by using both hands.
- (3) In the case where the operation of speed conversion of horizontal type mixer is carried out, the risk preventive method for the worker shall be taken.
- (4) In the case where the risk preventive device for worker is provided for the agitator in operation, various countermeasures shall be taken so that the normal operation of mixer is not damaged.
- (5) The horizontal type mixer shall be provided with respective single independent electric motor and its controller.

Further, a operation switch with a key shall be so provided that during the check and cleaning of the machinery, it is impossible to be actuated by other worker.

- (6) The attaching position of control-operation board shall be the position where the worker can see sufficiently even when the bowl is opened. For other than the stopping switch operating devices shall not be set in double.
- (7) The machine to return the medium dough to the horizontal type mixer shall be provided with interlock device for danger prevention for the worker.
- (8) The timer having humidity resistance shall be used.
- (9) The electric control board to be installed at the outer part of horizontal type mixer shall be water-proof.
- (10) The cooling jacket of horizontal type mixer shall be attached with such device that the pressures of all cooling mediums do not become the maximum or more set pressure.
- (11) The valve and controller to actuate the cooling medium in jacket of horizontal type mixer shall be attached at the position having no hindrance to safety of worker.

3.2.2 Sanitation Countermeasures The sanitation countermeasures shall be as follows:

- (1) The agitator and parts such as agitator shaft and the like shall be of such structure that their all surfaces become effectively clean according to the ordinary washing method.
- (2) The end part of agitator shaft shall be such structure that it contacts the surface of bowl for the contacting area to become minimum, and the all raw materials can be mixed suitably and not to be separated not less than the required amount.
- (3) The agitator sealring, including agitator hub shall be capable of being detached easily or exposed immediately, and be easy in washing of parts.
- (4) The surface of shaft attached with the sealring shall be in accordance with 4.1 of JIS B 9650.
- (5) All packing seals shall be of structure to prevent the water leakage and, provided with a complete drain device in order to prevent spreading until outer part when water leakage is caused.
- (6) The inlet of raw materials shall be of a suitable size for preventing leakage of raw materials and, attached with a collar.

Further, the door and cover shall be attached at the raw material inlet without clearance.

Further, in the case where the door and cover are made hinge type, these shall be of easily detachable structure, and be attached by such method that cracking and clearance are not caused.

- (7) The clearance between the top end of bowl of horizontal type mixer and the housing frame shall be not less than 100 mm.
- (8) The wheat flour throwing-in opening shall be of such structure that it is detachable and its parts are also detachable.
- (9) The throwing-in opening of liquid raw material shall be of sanitary structure and, be capable of being detached.

Further, the throwing-in opening shall be so attached to the bowl and cover as not to protrude into the bowl and hanging down type, not be used.

- (10) The sensitive device to be attached to the bowl surface shall be sealed in such structure that stains do not stay or be able to be detached easily.
- (11) The bowl of horizontal type mixer shall be complete in drainage and, exposed simply or attached with a drain tube to be detached simply.

- (12) In the case where part number is required such as in heater and the like, it shall be stamped on the upper end surface of shank and sleeve.
- (13) Pouring tube of liquid raw material, valve and attachments shall be of sanitary decomposition type or be such that no blocking of raw material is not caused. The end of such piping shall be of automatic drain type, and a check valve, not be used.
- (14) Bowl and agitator of horizontal type mixer shall be of such structure capable of being washed by rotating the agitator in a bowl containing a small amount of water, and, capable of exhausting water after washing simply.
- (15) The space where all surfaces can be cleaned shall be provided and, at the height not higher than the height of eyes capable of confirming the stains of upper surface as far as possible.

### 3.3 Divider

3.3.1 Safety Countermeasures The safety countermeasures shall be as follows:

- (1) The pinch parts or shear parts to be generated by reciprocating motion or rotary motion shall be provided with enclosure in all or protective device to be of such structure to protect the hand and fingers of worker from danger.
- (2) The guard for front face of divider shall be capable of regulating the dough weight in not detached state.
- (3) The rear part of divider shall be applied with protection by attaching the complete cover to enclose all driving parts or by providing individual enclosures to remove various dangers.

Further, on the cover of rear part an interlock guard shall be provided so that, when the cover is opened, the machinery does not actuate.

- (4) The oil hole for knife at the rear part of divider shall be of such dimensions that the finger of worker does not pass through.
- (5) The groove hole of arm for knife driving at the rear part of divider shall be attached with a preventive device of saddle type or other protecting device.
- (6) The divider shall be provided with a overload safety device of mechanical type such as shear pin or electric instantaneous actuation type.

3.3.2 Sanitation Countermeasures The sanitation countermeasures shall be as follows:

- (1) Parts to be attached to the piston shall not be at the food contact parts.

- (2) The system to feed oil to the contact surface of dough shall have an oil tank at a position easy to be approached for cleaning and the oil feed piping, be easy in travelling and cleaning.
- (3) The dust box shall be provided with attached cover, and the dust collecting part shall be easy for a worker to approach for cleaning to be able to be travelled partially.
- (4) The required dough hopper and dough lay down device shall be attached with each lid.
- (5) The attached conveyor shall be of such structure that the belt can be travelled or detached for cleaning.
- (6) In the case where the attached dough lay-down device, hopper, chute, etc. are erected, it shall be able to approach them.

### 3.4 Rounder

3.4.1 Safety Countermeasures The safety countermeasures shall be in accordance with the specifications of 3.1 of JIS B 9650.

3.4.2 Sanitation Countermeasures The sanitation countermeasures shall be as follows:

- (1) As to the rounder cone, grooves are required to cut in the surface of cone in some cases, these grooves shall be not less than 1.5 mm in bottom part radius, and in the case where the width of groove is not more than 3 mm, it shall be semi-circle. These surfaces shall be smooth similarly to the food contacting part and, of such structure that the cleaning is capable of being carried out easily.
- (2) All surfaces shall be able to be approached in the meaning of visual angle and reaching of hand. However, except where the track or the contact surface between the spiral and the rounder cone is not more than 0.13 mm and the spiral edge is not more than 3 mm in width.
- (3) In the case where plastics material is attached on the surface, it shall be attached so that fissurings or crazings are not generated.

Further, in the case where adhesives are used for attaching of plastics material, the adhesives shall be nontoxic, nonhygroscopic and semi-permanent.

- (4) In the case where a dust guard and canopy are used for rounder, these shall be taken into consideration that these are a part of region where the worker can approach and be movable for cleaning.
- (5) The attached conveyor shall be of such structure that the belt can be travelled for cleaning.
- (6) As to the dough chute placed at the height of floor, its edges shall be made higher than the floor surface by 100 mm, and attached with overlapped covers on it.

- (7) As to the dough chute, the parts which pass through ceiling and floor shall be sealed hermetically, or ground-finished or of travelling type.

Further, in the case of travelling type, the part between the ceiling and the floor shall be closed or sealed hermetically.

### 3.5 Moulder

3.5.1 Safety Countermeasures The safety countermeasures shall be as follows:

- (1) The moulder of machine feed type shall be attached with a hopper to be connected with a proof box and be prevented from contacting the rotary roller with hand by making so that the hand of worker does not enter into the hopper.
- (2) The moulder of dough hand-putting-in type shall be provided with an inlet conveyor or a high back hopper to be such structure that the hand fingers of worker are not wound into the rotary roller.

Further, edges of upper part of this hopper shall be rounded sufficiently so as to be such structure that the hand of worker is not injured when contacted or struck.

- (3) The dough chute shall be provided with an emergency stop bar, and this bar shall be equipped at a place where the body of worker pushes this bar in cases where the worker contacts this roller by sliding or turning down or the hand fingers are nipped by the roller. This bar shall be so made that the circuit is opened immediately by the pressure of body of worker and the driving electric motor is stopped.

Further, a brake which actuates automatically by electricity or other action shall be provided to be such structure that at the instant of stopping of power the roller rapidly stops.

3.5.2 Sanitation Countermeasures The sanitation countermeasures shall be as follows:

- (1) In the case of using curling rolls, those shall be of such structure that the cleaning of thin-long grooves and the horizontal grooves is easy. Such thin-long grooves and horizontal grooves shall be grooves of round cut-opening. All opening parts, holes or fissurings shall not be provided. In the case of using chains or belts for curling, those shall be of structure capable of being detached for cleaning.
- (2) The powder screening machine shall be provided an accessory cover.

Further, the cover shall be detachable and of such structure that it is able to be decomposed easily for cleaning.

- (3) A detachable type receiving dish shall be provided at the lower part for collecting the excessive powders and small pieces of dough.

### 3.6 Proof Box

3.6.1 Safety Countermeasures The safety countermeasures shall be as follows:

- (1) The safety guard for preventing danger for hand and finger of worker to be wound in dough distributing vanes at inlet part of proof box shall be provided or of such structure that the rotation of vanes are stopped by mechanical trip device such as safety clutch.
- (2) The safety guard shall be attached at the engaging part of chain and sprocket in order to prevent the shear and pinch action generated by running of chain and tray during operation of proof box.
- (3) The door or panel for overseeing of proof box shall be attached with net-in glass or plastic panel not to be crushed and of such structure the inner part can be seen through the door.
- (4) In the case of proof box which the worker comes in and out within the machinery, it shall be of such structure that all doors can be opened in both inner and outer sides.

3.6.2 Sanitation Countermeasures The sanitation countermeasures shall be as follows:

- (1) The inner and outer all frame works, bumper, induction device, track, strut, etc. of structures to be set on floor or attached to ceiling, wall, etc. shall be sealed hermetically at the contact places.
- (2) The joining parts of all panel assembly and armour surfaces of inner part of structure shall be sealed hermetically or, of such structure as to be able to be detached for cleaning.
- (3) The track and induction device to be used for door, cover, panel for inlet opening shall be of such structure that cleaning is easy and grains, condensates, broken pieces of food or outer dusts are not accumulated.
- (4) The parts of inner surfaces and inner parts in chamber of air conditioning unit shall be of such structure that the worker can approach easily.
- (5) The place where water is to be accumulated shall be provided with a complete drain device.
- (6) All air to be introduced mechanically into the space to be air conditioned shall be filtered or washed to remove grains of 50  $\mu\text{m}$  or over and, unless specially required for working process, it shall not contain fats and oils, moisture, and other liquid.
- (7) The water to be introduced into moisture feed machine in the conditioned space to be used for air cleaning, vapor cooling and humidity holding shall be drinking water.

- (8) The material of structures of inner parts shall be corrosion resistant or applied with protective coating.
- (9) The wall, ceiling and other enclosing surface shall be used of material of quality not to absorb food raw material or applied with protective coating.
- (10) Materials for check opening and panel shall be rupture resistant and humidity resistant.
- (11) The installation of duct for air conditioning shall be as follows:
  - (a) The duct shall be provided with opening or detachable part at a suitable place for check and suction cleaning or cleaning according to other suitable cleaning method.
  - (b) The jointing portion of wall, ceiling or floor surface with the single side or both sides shall be sealed hermetically or the duct, be detachable type.
  - (c) The duct shall be sealed hermetically at the jointing portion or manufactured to be partially detachable type and assembled.
  - (d) Ducts to pass water shall be provided with slope so as to drain completely and be carried out with piping with taking into consideration so that water does not leak on the product or water drops do not adhere.
  - (e) The square shape ducts non-movable and neighboring to the attaching surface shall be sealed hermetically or be set with providing interval of not less than  $1/5$  of duct width between the neighboring surface. Provided that the interval shall not be 50 mm or less.
  - (f) The circular shape duct shall be set with separating from the attaching surface so that the duct and neighboring surface can be approached easily.
  - (g) The corrosion preventive screen of not more than 6 mm in aperture as the protective device shall be attached at the outside of air intake hole.

### 3.7 Oven

3.7.1 Safety Countermeasures The safety countermeasures shall be as follows:

- (1) The roof and other parts of the oven shall have sufficient strength for structure and, even when the worker comes on the oven and in the inner part of oven, these shall be able to withstand.
- (2) In the case of mechanical type oven, the emergency stop device shall be set at nearly the definite position of worker.
- (3) All pipings shall be subjected to gas tightness test.

- (4) The connecting part of piping of oven shall not be applied with soldering. For the oven to feed fuel or vapor, the screw joint, flanged joint or welding shall be used at the connecting part of piping.
- (5) The main isolation valve shall be so set that it is able to be operated independently to the valve of automatic actuation, and at emergency it cuts off the fuel or vapor and in addition, be as follows:
  - (a) The position of main isolation valve shall be set at a portion where the explosion, fire, etc. are not generated in the neighborhood of this valve.
  - (b) The main isolation valve shall be of such structure that it is capable of locking at "close" position when the worker enters in the oven or when the oven is not actuating.
- (6) The protective device for gas initial fire, in the case where the protection of main fire flame of burner is not practical, shall be set at a place where the initial fire can not contact the fire flame electrode if the initial fire does not pass through the passage of main fire flame. At the time of incomplete initial fire of gas, the fuel supply to the burner shall be cut off automatically.
- (7) The oven of many burner type shall be provided with individual atmospheric pressure type initial fire devices which actuate by secondary air and supply gas existing sufficiently in bread calcining chamber or the ignition device of electric spark type, be set at each burner.
- (8) In the case where the electric ignition device having heating capacity exceeding 40000 kcal/h by one burner is provided, it shall be protected by adding rapid type combustion safety device.

Further, the combustion safety device to be used by connecting with the electric type ignition device of oven shall be of such structure that the explosive mixed gas is not accumulated in inside of oven before starting of ignition.

- (9) In the case where fuel supply is carried out at line pressure, the safety isolation valve as the following shall be provided in the combustion tube of this side of burner:
  - (a) In the case where the fuel supply pressure becomes the line pressure or higher, a safety isolation valve shall be provided in the fuel line at this side of burner. However, except where other automatic valve exists in the fuel supply line and when the compressing device is stopped the flow of fuel extinguishes.
  - (b) The safety isolation valve shall be free from leakage securely.
  - (c) The gland packing shall not be such that when the packing is fastened excessively, the safety isolation valve becomes not to actuate.



- (d) The safety isolation valve of electric actuation shall be at the position of "close" usually and, of such structure that the cut off of fuel supply is not dependent upon the electric actuation.
- (e) In the case of reopening after the safety isolation valve has become "close", it shall be of hand operating system.

Further, in the case of electric control system, it shall be of such circuit that the reopening of the safety isolation valve is carried out by hand operation.

- (f) The safety isolation valve of hand-operation type reactivation style shall be of such structure that it is impossible to lock from outside in the opening state.
- (g) In the case where the air for combustion is supplied by a blower, it shall be so interlocked that when the air supply is incomplete, the safety isolation valve is closed.
- (h) In the case where gas ignition or electric ignition is used, the safety isolation valve shall be so made that at the time of incomplete ignition it is closed.

Further, in the case where combustion safety device is provided at the burner, it shall be so made that at the time of incomplete fire flame of burner, the safety isolation valve is closed.

- (10) In the case where a main fuel isolation valve of hand-operation type is provided with each oven, it shall be set at this side of all other valves in the system.
- (11) In the case where the gas burner or oil burner has respectively heating capacity exceeding 40000 kcal/h, all safety devices of fire-flame actuation type shall be provided.

Further, the actuation interval of safety device to actuate by incomplete fire flame shall not exceed two seconds. The operation of restarting of burner, in the case where the gas burner or oil burner is isolated, shall be hand operation.

- (12) Each space part of oven (excepting direct fire type oven) having a fear for explosive mixed gas to be filled shall be protected by providing an explosive draft device. This explosive draft device shall be made of material of light weight applied with a suitable heat-insulating material.
  - (a) The rigid and heavy explosive draft device shall be fixed by chain and others according to a suitable method, and scattering prevention of parts shall be so carried out that the worker is not given the injury.
  - (b) In the case where the explosive draft device is provided at a place where the worker of oven or the worker in the neighborhood of the oven is given injury due to scattering parts and gas, for protection of inner parts and outer parts, the protective device made rigid or the elastic body made of nonincombustible material shall be used.

- (c) In the case where it is guaranteed that even the vessel of fuel is repeated by explosion in the heating system of oven, the deformation is not caused, the specifications of (a) and (b) do not apply.
- (13) The oven (except electric heating type) shall be connected with the suitable and rigid chimney as follows or broad chimney and, feed out the combustion gas.
- (a) The pipe of chimney or stand seat shall be supported suitably.
  - (b) The structure shall be such that the pipe of chimney or the stand seat does not enter with crossing the flue inner wall of chimney.
  - (c) The flue pipe shall be joined with the wall of chimney or of such structure as to prevent permeation of air by covering with other method.
  - (d) The flue damper taken into consideration with the natural draft or other draft regulation device shall be provided.
  - (e) At the place where a damper is used, the limiting device at the lowest or the highest point shall be provided at the suitable position. The lowest position of damper shall be so made that it is able to adjust so as to obtain the combustion air amount at the lowest output of oven. In the case where the flue damper is connected with the oil-heating type oven or gas heating type oven, when the damper is closed, the burner shall be made also to be stopped.
- (14) In the case where the initial pressure of fuel is lower than the combustion air pressure, a check valve shall be provided so that the air does not back flow to the fuel piping. For example, in the case where the using pressure of gas is lower than the air pressure in the gas burner type apparatus, a check valve shall be provided in the gas piping in this side of mixing device.
- (15) In the case where the gas supply pressure is set at a pressure rather higher than the set pressure in oven, the following gas-pressure regulator shall be provided.
- (a) In the case where the gas pressure regulator is used, the gas pressure to feed to manifold shall be within 10 % of consuming actuation pressure from the maximum up to the minimum.
  - (b) The pressure regulator shall be the one of spring type, weight type or pressure balancing type. For the one of spring type or weight type, the spring or weight shall be entered in a suitable housing. The regulator of weight-lever type shall not be used in every case.
  - (c) In the case of gas type pressure regulator, the vent to atmospheric air shall be erected in order to carry out good actuation by connecting to the atmospheric air.

- (d) At the outlet of pressure regulator for high pressure gas, the relief valve shall be provided. For the exhaust gas from this valve, piping shall be so provided that it goes out to the outside of building.
- (16) The air chamber requiring the connection with atmospheric air such as diaphragm, bellows, etc. shall be separated from gas state fuel or volatile fuel by flexible film and be connected with the outside atmospheric air by means of a tube of 13 mm at least. The outside of this tube shall be so made that it is neither filled with air due to icing, insects and other causes nor becomes the state where stoppered incidentally. For this purpose, T type double elbow style joint piping shall be carried out downward at the end of tube, and metallic screen, attached at the outlet. Where several air chamber adjacent to each other are used, this vent pipe may be common to them.
- (17) In case where there is a fear that the suitable acuation of mixer and burner are hindered by accumulation of dust at air feed part, a suitable air pressure filter shall be attached at the inlet of air feed part.

Further, the preparatory air pressure filter shall be prepared so as to be capable of exchanging the air pressure filter at washing.

- (18) The oven shall be installed on the noninflammable foundation. However, in a special case where it is inevitably installed on a inflammable floor, the bottom part of the oven shall be made heat-resistant and the vent, made good by separating by 75 mm at least from the floor.

Further, the temperature of inflammable floor under the oven shall not exceed 70°C.

- (19) The upper part of oven shall be exerted sufficiently with heat-insulating material.
- (20) The place where the duct or chimney of oven passes through the inflammable wall or ceiling shall be provided with a clearance, and exerted with heat resistant member so as the inflammable member not to exceed 70°C.
- (21) The columns or structural members of building shall not be made to cross the oven. In the case where these members appreaches to the outer plate of oven at 150 mm or less, the column or structural member shall be protected so as not to exceed 70°C in temperature by using heat-resistant member.

- (22) The gas combustion device shall be as follows:

- (22.1) The injection device of atmospheric pressure (low pressure) type gas combustion device shall be of such structure that the axis of injection device and the center of gas injection coincide correctly, and, so worked. The air regulator or shutter shall be of fixed type or provided with lock device so as the fixing after regulation not to vary incidentally.

- (22.2) The damper for draft control of atmospheric pressure type gas combustion oven shall be connected with the gas piping so that the gas does not enter the burner when the damper is closed, and in addition, as follows:
- (a) The tube type combustion burner which is extruded into the calcining chamber of atmospheric pressure gas combustion type oven shall be attached with the secondary air duct over the whole length of lower part of burner. The air inlet part of this duct shall be provided at the outer part of calcining chamber.
  - (b) The flue damper of atmospheric pressure type gas combustion style oven shall be provided with the hole of diameter as shown in Table.

Table Holes to Be Provided at Flue Damper

Unit: mm

Flue diameter	Hole diameter
75 to 125	12.5
150 to 250	25.0
275 to 375	38.0

- (22.3) The nozzle of atmospheric pressure type gas combustion device or blast type burner shall be provided with the initial fire or electric ignition device. However, as to the device having the instantaneous actuating combustion safety device having regulating function of flame from the maximum to the minimum and actuates by the flame of main burner, for only the first ignition, the automatic type or manual type torch ignition may be used.
- (22.4) The perforated pipe burner having many holes of ribbon, slit, chip state or similar type shall be so made that always the stabilized flame can be obtained in the whole range where the flame becomes smaller over the whole length of burner or in the draft state similar thereto generated during operating the oven. However, except where if the ignition place is even though only one place immediately all holes are ignited, independently upon whether the gas amount to be supplied to the burner is maximum or minimum.
- (22.5) The burner for completely mixed gas shall be so made that back fire and fire extinguishing are not caused in the range where the operation of burner is possible, and in addition, as follows:

- (a) In perforated type burner (for example, burners of ribbon, strip, chip types, etc.), in the case where completely mixed gas system is used, the length of burner shall be so made that ignition is capable on the whole range at the same time, and this shall actuate in the normal state, or under the oven conditions containing steam, or also in the state of oven to extinguish the flame.
  - (b) In the case where many burners for completely mixed gas are connected with only one gas mixing device, electric type or gas type ignitor shall be provided.
- (22.6) The high pressure gas injection devices (use gas exceeding 700 mmAq in pressure) shall be of such structure that centers of axes of gas injection devices are coincident and in addition, as follows:
- (a) Between the injection device for high pressure and the burner, the valve and other hindering matters shall not be assembled.
  - (b) The injection device for high pressure shall be provided with the gas regulator used of individually a definite detachable type orifice or regulating type orifice. In the case where the regulating type orifice is used, the plug having no gas leak shall be used at the regulating threaded part to protect.
  - (c) The air regulating part of high pressure type injection device shall be employed with secure lock method.
  - (d) The attaching position of high pressure type injection device shall be at a place where air regulation can be carried out even during the actuation of oven.
  - (e) The attaching position of high pressure type injection device shall be at the place where does not cause back fire, nor give injury the worker nor ignite the inflammable substances.
  - (f) In the high pressure type injection device to be used for gas combustion device, in the case where the mixture of air and gas is supplied by pressurizing, the air amount to be mixed in gas shall be made little, and so used that it does not become the mixing state not more than the upper limit of explosion.
  - (g) As to the regulating device of low pressure injection device (air pressure 350 to 1050 mmAq, gas pressure at approximately atmospheric pressure to be used), the regulating device to determine the ratio of gas and air shall be provided with a secure lock device.
- (22.7) Among the low pressure regulation type injection devices having zero governor, in the case where the resistance value of mixed gas tube is not corrected, the valve and other hindering matters shall not be provided between the injection device and the gas burner.

Further, the air chamber of diaphragm part of governor of low pressure regulation type injection device shall be ventilated to the outer part.

- (22.8) In the case of two pipe type system using pressurized air and gas, the valve and other hindering matters shall not be provided between the mixing valve and the burner. However, except where the over pressure rise preventive device for mixed pressure is provided.

Further, the two pipe type system shall be provided with a cleaning device before air and gas enter the mixing device.

- (23) The gas mixing device shall be as follows:

- (23.1) All burners to receive the supply of completely mixed gas by the gas mixing device shall be provided with the flash flame preventive device.

This device shall have an automatic isolation valve worked by temperature, be attached at a place as near the burner as possible, and be provided at the outlet of premixer at this side of each burner isolating device and in addition, be as follows:

- (a) The main mixing line and each appliance for gas shall be provided with the back-fire preventive device and relief valve.
- (b) All diaphragms and air chambers shall be connected with the atmospheric air outside the building.
- (c) The automatic safety isolation valve shall be provided in front of mixing valve in gas piping. This position shall be before the inlet of compressor or near the gas feed part to isolate the flowing into the compressor.
- (d) The air taking in opening of gas mixing device shall take-in by pipe from the position of outside of building and it, be provided with a dust preventive device.

- (23.2) Between the blower for mixing gas and the burner, the valve and other hindering matters shall not be provided. The blower for mixing gas shall be as follows:

- (a) The blower for mixing gas feeds out the mixture of gas and air, and shall be of such structure that the feed-out is not stopped and back fire is not caused over the whole regulating range of its amount.
- (b) The blower for mixing gas shall be provided with a pressure regulating device as for prevention of variation of air-gas ratio at the gas pipe part of inlet of mixing valve.
- (c) The body of blower for mixing gas shall be of such structure that it is endurable even though explosion is generated in its inside.
- (d) The blower for mixing gas shall be provided with an automatic isolation valve in the piping at this side of the blower. This isolation valve shall be so made that it immediately actuates when abnormalities and interruption to passage of electricity are caused.

(24) The oil combustion device shall be as follows:

(24.1) The oil burner shall be that specified in JIS B 8404, JIS B 8405 or JIS B 8406 and in addition, as follows:

- (a) The oil burner shall be provided with electric ignitor or gas initial fire device.
- (b) The oil burner shall be provided with rapid combustion safety device to actuate by the flame of main burner to prevent incomplete flame and excessively large flow out of oil. The actuating time of isolation of oil actuating against incomplete flame, shall be so short time that the mixing state having a fear of explosion is not caused or the fuel oil up to the dangerous amount does not enter the combustion device. However, except the oven having the combustion safety device specified in JIS B 8415 of not more than 40000 kcal/h.
- (c) The isolation of fuel supply shall be capable of carrying out by stopping the individual burner pump having the pressure isolation valve or by closing the corresponding valve.
- (d) The oil combustion type oven shall be provided with a damper and, of such structure as to feed a small amount of air into the furnace always.
- (e) The oil burner shall be able to be drawn out from the furnace (for check and the like) and, provided with the interlock so as the burner not to start actuation at the time of drawing out.
- (f) In the case where preheating of oil is required, it shall be controlled by thermostat by using steam, warm water or electric heater. These heaters shall be of such structure that all joint parts are free from oil leakage. The attaching position of thermometer shall be a place suitable for temperature display of heating oil. For the heater, prevention of generation of abnormal pressure shall be conducted according to the bypass and other adequate method.
- (g) The oil burner provided with the mechanical type air feed device shall be provided with an interlock between the air feed system and the oil feed system so that the burner does not actuate if the air is not fed so as the burner to become normal combustion condition.

(24.2) The high pressure micro pulverizing type oil burner shall be provided with a pressure isolation valve between the pump and the nozzle.

(24.3) The air type micro pulverizing burner having a regulation device from the maximum until the minimum and of such system as to cut the ignition device after completion of ignition shall be provided with the rapid fire flame safety device directly connected with the flame of main burner.

- (24.4) The mechanical type micro pulverizing burner of rotary type which actuates by "open" and "close" controls shall be provided with safety device to actuate by main burner.
- (24.5) In the case of gasification type burner, it shall be of such structure of system that the air damper opens before oil enters the burner.
- (24.6) The burner receiving the oil supply by gasification system shall be provided with protective type initial fire or electric type initial fire. For the gasification type heating device, the burner shall be protected according to the specifications of (22).
- (25) Electric heating device shall be as follows:
  - (a) The heating member exposed in calcining chamber shall be attached with protective device to protect for the completed product, worker, electric device, etc. not to contact incidentally.
  - (b) The breaking switch or breaker shall be attached at a position where the hand can reach easily. The main switch or breaker shall be provided with lock device and in the case where on the electric device or in the oven other working is carried out, it shall be so made that it is able to lock at the position of "open".
- (26) Direct fire type oven shall be as follows:
  - (a) The direct fire type oven shall be provided with a safety protecting device to deal with fuel, air or incomplete ignition.
  - (b) The direct fire type oven having heating capacity exceeding 40000 kcal/h shall be vent-exhausted before the ignition device, blower for combustion air and fuel begin the actuation so that the gas accumulated after operation pause does not explode. For this preventilation, the air in oven shall be exhausted outside the building so that the air in calcining chamber varies four times at least, and new fresh air is taken-in. In the case where the heating device is cut off to be stopped by means of the safety device, this preventilation shall be repeated without fail.
- (27) Direct fire circulation type oven shall be as follows:
  - (a) Each fan for circulation of direct fire circulation type oven shall be so made that the fuel is shut off at the time of stopping of fan by the safety valve interlocked with the burner.
  - (b) The burner fire flame part of direct fire circulation type oven or the burner shall be provided with fire flame sensitive safety device actuating instantaneously and, made so that when the burner is incomplete the fuel supply is cut off automatically.
  - (c) The direct fire circulation type oven shall be provided with a preventilator.



- (d) The fan of direct fire circulation type oven shall be constituted of material suitable for actuating temperature, and, taken with sufficient safety rate for prevention of rupture of impeller.
- (e) The impeller of direct-fire circulation type oven shall be so made that it does not contact directly to the fire flame of burner or the burner.
- (f) The fans existing in the oven or on the oven in the direct fire circulation type oven shall be provided with the temperature limiting device for prevention of overheating.
- (g) In the case where the burner of direct-fire circulation type oven is attached at a high position, the fixed type stage shall be provided so as to be able to approach the burner part safely and easily.
- (28) The indirect heating multi burner type oven shall be provided with safety isolation valve to interlock with the ignition device, air pressure part and gas pressure part.
- (29) The indirect heating circulation type oven shall be as follows:
  - (a) All of oil burners or gas burners of indirect heating oven shall be provided with fire-flame sensitive safety device of instantaneous actuation type.
  - (b) The duct device of indirect heating circulation type oven shall be provided with an explosion-time draft device of not less than 0.1 m<sup>2</sup> in total area. The position of this explosion-time draft device shall be at a place where hot gas or scattering parts do not come in flying.
  - (c) The fan and other parts of indirect heating circulation type oven shall be in accordance with the specifications of (26), as appropriate.

3.7.2 Sanitation Countermeasures The sanitation countermeasures shall be as follows:

- (1) The furnace floor of wire mesh and metal band movement type shall be provided with the mechanism which is capable of cleaning the calcining surface always even during working.
- (2) The guide shall be so attached that the oil supplied chain does not contact with the product.
- (3) The moving chain shall be of such structure that even in the case where graphite or other lubricant is too much it is not influence thereby and moves smoothly always.
- (4) It shall be of such structure that the oil feed to moving chain can be carried out at the place other than sprocket.
- (5) The door for repairing shall be so attached directly to the oven furnace body that the whole inner part of oven can be viewed, and the height of lower part of door for cleaning of band oven, be same as that of oven furnace floor.

- (6) All surfaces having possibility that crumbs and toppings may be accumulated by falling down shall be so made that hand can reach easily to be capable of cleaning.
- (7) The check window shall be able to be repaired easily or to be detached and further, attached with shutter made of heat resistant material.
- (8) All luminaires shall be of housing system for the purpose to have humidity resistance and, attached with the shutter by heat resistant fittings for prevention of rupture.
- (9) The dust van to receive crumbs and toppings to be fallen from the clearance parts between the outlet part and the inlet part of oven shall be prepared. The dust van shall be able to be detached simply and, of such size capable of discarding the dust by carrying easily.
- (10) The outer surface cover excepting adiabatic plate shall be detachable easily. The cover shall be attached at a position where its lowest part is at not less than 50 mm from the floor surface.
- (11) The fan apparatus for convection passing through the outer side or inner side of oven furnace body to the calcining chamber shall be of such structure that washing, cleaning and repairing are easy.
- (12) The heating device of oven shall be of such structure as to prevent intrusion of ash, and, soot and smoke into the calcining chamber.
- (13) All nonmetallic materials to be used as the structural members of calcining furnace floor shall be free from unevenness, cracks, grooves, etc.
- (14) The coating of inner parts such as ceiling part, upper parts of inlet, outlet, etc. shall be of such heat resistant material to be free from cracking, and peeling off, which contains no toxic matters.
- (15) The insulating member or heat-insulating member of piping shall be easy in cleaning and, not penetrated by moisture. The surfaces of all insulating members or heat insulating members shall be hard-finished and capable of being cleaned easily.
- (16) The ceiling surface of oven shall be hard finished to be easy in cleaning.
- (17) The chimney of oven shall be so attached that the horizontal part becomes shortest.
- (18) The chimney of oven shall be jointed so completely that adhered matters do not leak from the joint part. All jointing parts shall be sealed so completely that the attaching metallic fittings and the like do not extrude into the inner part of chimney.
- (19) The chimney of oven shall be provided with cleaning opening and trap for piled solid matters.

- (20) The oven shall be provided with sufficient intervals from other facilities, wall surfaces, etc. and, be made so as the repairing of oven to be easy.
- (21) The conduit tubes to be attached at the side face of oven and all pipings shall be attached with separating by 50 mm or more from the oven side face by using the independent attaching metallic fittings.

Further, the pipings to be attached to the ceiling part of oven shall be attached by separating by 200 mm or more from the ceiling surface by using the similar method.

- (22) The oven frame part contacting the floor surface and the housing part of conduit tube shall be hardened by flowing-in concrete or sealed hermetically.
- (23) The pit for rotary drum of band oven shall be provided with a sufficient space so as the repairing to be able to be carried out easily.
- (24) The vapor to be blown into the furnace used during calcining shall be so made that toxic matters are not contained.
- (25) The exhaust water drained and over flowed from vapor supply device of oven shall be exhausted with removing gas bubbles.

### 3.8 Frier

3.8.1 Safety Countermeasures The safety countermeasures shall be as follows:

- (1) The oil tank, in either cases of throttling work or welding work, shall be of such structure that the deformations in quality and in shape due to heat or oil are not generated.
- (2) In the case of gas combustion system, the gas piping system shall be provided with emergency isolation valve to detect gas pressure, combustion and temperature abnormalities and to have function to actuate the emergency isolation valve.
- (3) In the case of electric heating type, it shall have functions of abnormal high temperature detection and electric leakage protection.
- (4) The check window and panel shall be of materials difficult in breakage.
- (5) In the case where upper hood is set, it shall be at the height not interfering with the worker.
- (6) The duct for hood shall be provided with damper with a temperature fuse.
- (7) The exhaust ducts for combustion and for hood shall be set respectively independently.

- (8) In the case of gas combustion system, the earthquake sensitive device shall be provided to actuate the emergency isolation valve of (2).

3.8.2 Sanitation Countermeasures The sanitation countermeasures shall be as follows:

- (1) The passing parts of products shall be able to be detached easily for cleaning of feed conveyor, lift net, etc.
- (2) The oil drain of oil tank shall be of such structure it is able to carry out completely.
- (3) For the piping for oil circulation, joints shall be used so that the disassembly and assembly can be carried out easily.
- (4) In the case of having depositor, the hopper shall be attached with cover.

Further, in the case of using compressed air in pressurizing type, it shall be of such mechanism that the lubricating oil of compressor is not mixed-in.

- (5) The interval between the frier and the set floor surface shall have air layer of not less than 150 mm.
- (6) The chimney, duct, hood and canopies for exhaust to outside shall be attached with filter so as foreign matters from outer part not to enter and, be of such structure that it is detachable easily for cleaning.
- (7) At the lower part of hood, oil reservoir shall be provided and, of such structure that the handling for cleaning is easy.
- (8) The connecting part of hood and duct shall be provided with a filter, and, of such structure that the handling for cleaning is easy.

Further, the attaching part of filter shall be of oil dropping protective structure.

### 3.9 Slicer

3.9.1 Safety Countermeasures The safety countermeasures shall be as follows:

- (1) The slicer shall be provided a feeding device for all final rove to the slice blade part.
- (2) In the case where, when the cover of blade frame of reciprocating blade type slicer is detached, the blade part is exposed, the interlock device shall be provided at that place, and when the cover is not at the definite position, the machinery, made not to start moving.

- (3) The slicer having blade of endless band type shall be provided with brake which actuates automatically by electricity or other action at each electric motor and, so made that during the electric motor is stopped it actuates.

Further, in the case where the door, panel, etc. adjacent to the blade tip are not closed, the electric motor shall be so made as not to rotate.

- (4) In the case where the slicer blade is required to be ground on the machinery, the guard shall be provided with leaving the sufficient space for the grinding stone to reach the blade part.
- (5) The place where the pusher fingers attached to the feed chain enter the bed plate of perpendicular direction feed device shall be covered on the pinch part.
- (6) In the case where the manufacturers of packaging machine and slicer are different, the chain, sprocket, belt and other moving parts shall be provided with suitable protection at the time of installation and connection. In this case, for the mutual wire connection of starting, stopping devices, those of safety shall be used.
- (7) As to the horizontal feed chain, excepting the front part and upper part, the other side face parts shall be covered completely.
- (8) The material to be used for check opening or the like shall be rupture-proof and humidity proof.

3.9.2 Sanitation Countermeasures The sanitation countermeasures shall be as follows:

- (1) The induction groove or guide for door, cover, check opening shall be of such structure that the collection of micropowders and condensates of products, spills, foreign matters, etc. is made minimum and is able to be cleaned easily.
- (2) The side surfaces, upper surface and other peripheral surface of the slicer shall be applied with protective coating film for corrosion prevention and absorbing no raw materials.

### 3.10 Bean Jam Wrapping Machine

3.10.1 Safety Countermeasures The safety countermeasures shall be as follows:

- (1) The rotary part of hopper shall be applied with stopper at operating and travelling of machinery to be able to be fixed.
- (2) In the case where the machinery is attached with castors, the machinery body shall be so made to be able to be fixed.
- (3) The electric motor shall be stored in inside of frame of machinery or in the case where it is exposed to outside, be totally-enclosed type or totally-enclosed fan cooled type.

- (4) The driving part of carrying out conveyor shall be provided with fixed guard in order to avoid the danger for the finger or hand to be wound-in.
- (5) The rod gear part of piston support shall be provided with a fixed guard.

3.10.2 Sanitation Countermeasures The sanitation countermeasures shall be as follows:

- (1) The feed-out screw of inner wrapping member (piston), cylinder, and rectification case shall be detachable type and easy in detaching.
- (2) The product carrying-out conveyor and conveyor plate shall be detachable type and capable of cleaning.

### 3.11 Depositor

3.11.1 Safety Countermeasures The pinch part or shearing part generated by reciprocating motion or rotary motion of depositor shall be enclosed by safety guard.

3.11.2 Sanitation Countermeasures The sanitation countermeasures shall be as follows:

- (1) The food contacting parts shall be of such structure as to be able to be detached easily for cleaning.
- (2) The hopper shall be provided with a cover detachable.

### 3.12 Make-up Table

3.12.1 Safety Countermeasures The safety countermeasures shall be as follows:

- (1) The guillotine cutter part shall be provided with a safety guard to be of such structure that hand and a part of human body do not reach the dangerous place.

Further, the safety guard capable of opening and closing shall be provided with the interlock device to be such structure that if the guard is opened the motion of cutter rapidly stops.

- (2) The rotary cutter shall be provided with the safety guard.
- (3) The rolling-press roller shall be provided with the safety guard.
- (4) The dough winding-in device shall be provided with the safety guard at its rotary part.
- (5) The circular cutter shall be provided with the safety guard.
- (6) Each type option to be set on the make-up table shall be made complete in its fixing by bolt fastening so as to be such structure that it is not loosened by vibration or moving of belt.



3.12.2 Sanitation Countermeasures The sanitation countermeasures shall be as follows:

- (1) Each type option on the table shall be of such structure that it is able to be detached or approached easily to be capable of cleaning.
- (2) The receiving box of scrap dough shall be of such structure to be capable of being detached easily.



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